[0186] Referring to FIG. **15**, X-rays are radiated to an object (operation **681**). The radiated X-rays are used for main imaging and include a plurality of energy bands predetermined depending on the object.

[0187] The X-rays passing through the object are detected (operation **682**) and the detected X-rays are divided according to individual energy bands to acquire a plurality of image signals (operation **683**). An image signal of the entire energy band may be acquired.

[0188] One of the image signals is analyzed and characteristics of the object are evaluated (operation **684**). The analyzed image signal may be an image signal of the entire energy band, an image signal of a low energy band or an image signal of a high energy band according to the object.

[0189] In operation **685**, it is determined that the characteristic of the object corresponds to a multiple energy X-ray image (YES), as for example, the tissues of the object are dense and/or an image with improved contrast between tissues is needed, and a multiple energy X-ray image of the object is produced.

[0190] For this purpose, the acquired image signals are subjected to multiple energy image processing to produce a multiple energy X-ray image (operation **686**) and the produced image is displayed on the display (operation **687**).

[0191] If, in operation **685**, it is determined that the characteristic of object does not correspond to a multiple energy X-ray image (NO), as for example, the tissues of the object are not dense and/or easy detection of lesions is possible with a single energy X-ray image, a single energy X-ray image of the object is produced.

[0192] For this purpose, one of the acquired image signals is subjected to image processing to produce a single energy X-ray image (operation **688**) and the produced image is displayed on the display (operation **687**).

[0193] As apparent from the foregoing, at least one of a single energy X-ray image and a multiple energy X-ray image is produced according to tissue characteristics of the object and efficient image analysis is thus possible.

[0194] The foregoing exemplary embodiments and advantages are merely exemplary and are not to be construed as limiting. The present teaching can be readily applied to other types of apparatuses. Also, the description of the exemplary embodiments is intended to be illustrative, and not to limit the scope of the claims, and many alternatives, modifications, and variations will be apparent to those skilled in the art.

What is claimed is:

1. An X-ray imaging apparatus comprising:

an X-ray generator configured to generate X-rays and radiate the X-rays to an object;

an X-ray detector configured to detect the X-rays that have passed through the object and convert the detected X-rays into a signal; and

a controller configured to generate a single energy X-ray image and a plurality of multiple energy X-ray images using the signal and control a display to display the generated single energy X-ray image and the plurality of multiple energy X-ray images together.

2. The X-ray imaging apparatus according to claim **1**, wherein the controller is configured to analyze the signal and determine a characteristic of the object.

3. The X-ray imaging apparatus according to claim **2**, wherein the controller is configured to generate the plurality of multiple energy X-ray images based on the characteristic of the object.

4. The X-ray imaging apparatus according to claim **2**, wherein the controller is configured to control the display to display an image corresponding to the determined characteristic, among the single energy X-ray image and at least one of the plurality of multiple energy X-ray images, on a larger scale.

5. The X-ray imaging apparatus according to claim **2**, wherein the characteristic comprises at least one among a structure of internal tissues of the object, a ratio of respective internal tissues, and a density of a specific internal tissue.

6. The X-ray imaging apparatus according to claim **2**, wherein the X-ray generator is configured to radiate the X-rays having an energy band set according to a type or the characteristic of the object.

7. The X-ray imaging apparatus according to claim **2**, wherein the X-ray generator is configured to radiate the X-rays for a pre-shot, and

the controller is configured to determine the characteristic of the object based on signal acquired from the X-rays radiated for the pre-shot.

8. The X-ray imaging apparatus according to claim **2**, wherein the X-ray controller is configured to determine the characteristic of the object based on the signal used to generate the single energy X-ray image.

9. The X-ray imaging apparatus according to claim **2**, wherein the controller is configured to calculate a ratio of a parenchymal tissue to a total breast tissue, calculate a breast density based on the ratio, and determine whether the calculated density exceeds a reference value.

10. The X-ray imaging apparatus according to claim **9**, wherein the controller is configured to determine that the characteristic of the object corresponds to at least one of the plurality of multiple energy X-ray images when the calculated density exceeds the reference value, and

the X-ray generator is configured to respectively radiate the X-rays having different energy bands which are set depending on the characteristic of the object.

11. The X-ray imaging apparatus according to claim **1**, wherein the plurality of multiple energy X-ray images comprise at least one among an image having an increased contrast between soft tissues and lesions of the object and an image having an increased contrast of soft tissues and hard tissues of the object.

12. The X-ray imaging apparatus according to claim **1**, wherein the X-ray detector is configured to separate the detected X-rays according to different energy bands and acquire a plurality of signals corresponding to the different energy bands from the separated X-rays.

13. The X-ray imaging apparatus according to claim **12**, wherein the plurality of multiple energy X-ray images comprises an image generated by using the plurality of signals, in which a substance of the object has an increased contrast.

14. The X-ray imaging apparatus according to claim **12**, wherein the single energy X-ray image comprises an X-ray image corresponding to an entire energy band of the detected X-rays using the signal corresponding to the entire energy band, and

wherein the entire energy band comprises the different energy bands.